

ESD5452E

2-Lines, Bi-directional, Transient Voltage Suppressors

<http://www.sh-willsemi.com>

Descriptions

The ESD5452E is a bi-directional TVS (Transient Voltage Suppressor). It is specifically designed to protect sensitive electronic components which are connected to low speed data lines and control lines from over-stress caused by ESD (Electrostatic Discharge), EFT (Electrical Fast Transients) and Lightning.

The ESD5452E may be used to provide ESD protection up to $\pm 30\text{kV}$ (contact and air discharge) according to IEC61000-4-2, and withstand peak pulse current up to 8A (8/20 μs) according to IEC61000-4-5.

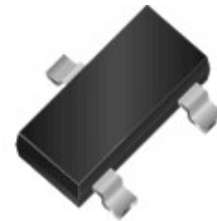
The ESD5452E is available in SOT-23 package. Standard products are Pb-free and Halogen-free.

Features

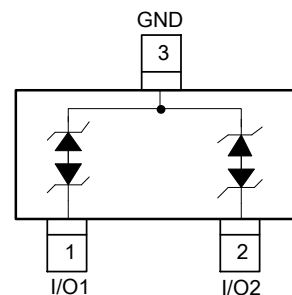
- Reverse stand-off voltage: $\pm 5\text{V}$ Max
- Transient protection for each line according to
IEC61000-4-2 (ESD): $\pm 30\text{kV}$ (contact and air discharge)
IEC61000-4-4 (EFT): 40A (5/50ns)
IEC61000-4-5 (surge): 8A (8/20 μs)
- Capacitance: $C_J = 17.5\text{pF}$ typ.
- Low leakage current: $I_R < 1\text{nA}$ typ.
- Low clamping voltage: $V_{CL} = 9\text{V}$ typ. @ $I_{PP} = 16\text{A}$ (TLP)
- Solid-state silicon technology

Applications

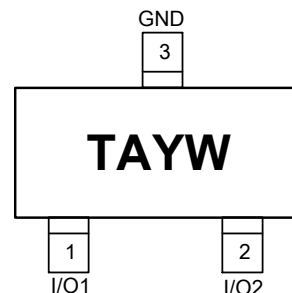
- Cellular handsets
- Tablets
- Laptops
- Other portable devices
- Network communication devices



SOT-23 (Bottom View)



Circuit diagram



TA = Device code

YW = Data code

Marking (Top View)

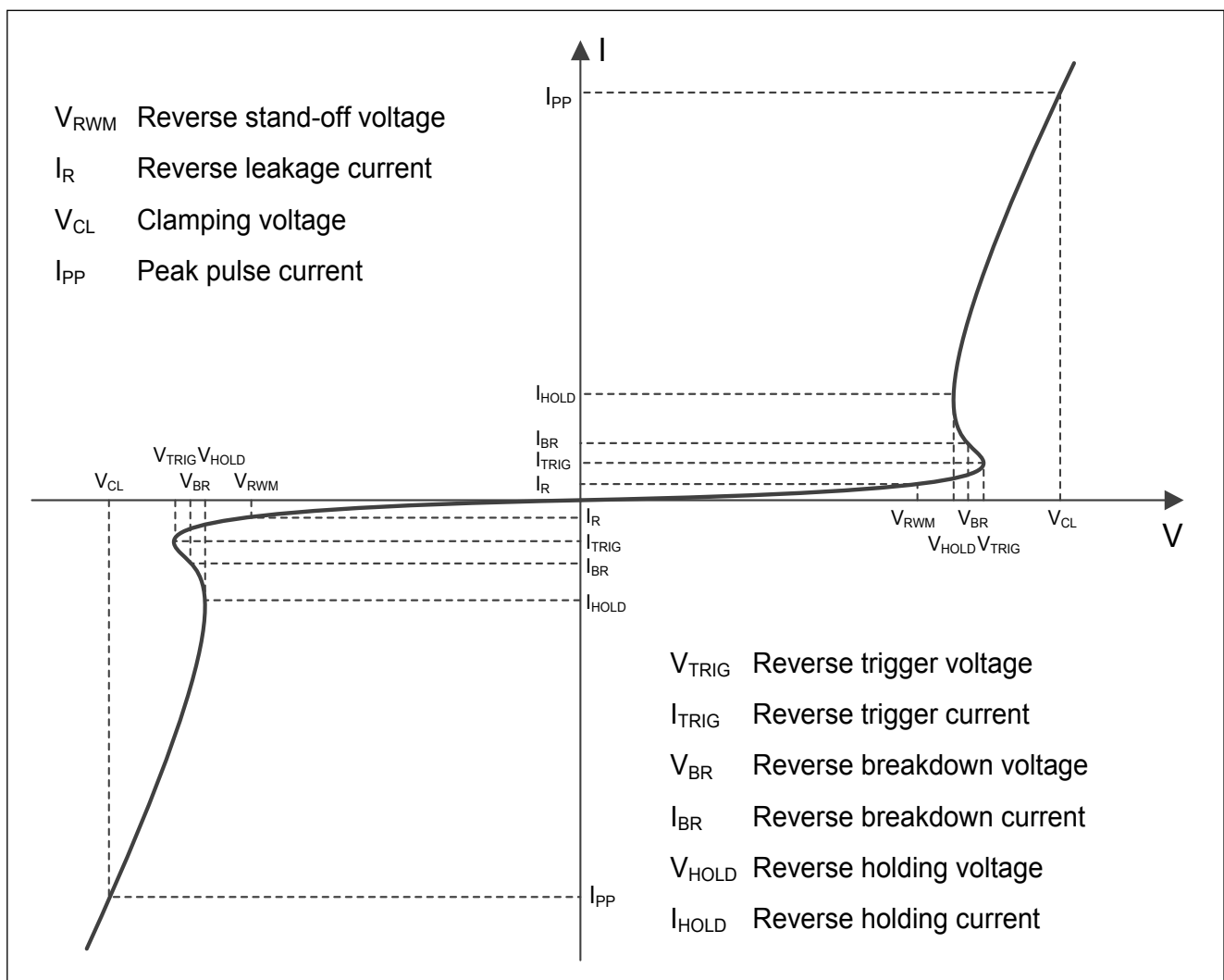
Order information

Device	Package	Shipping
ESD5452E-3/TR	SOT-23	3000/Tape&Reel

Absolute maximum ratings

Parameter	Symbol	Rating	Unit
Peak pulse power ($t_p = 8/20\mu s$)	P_{pk}	80	W
Peak pulse current ($t_p = 8/20\mu s$)	I_{PP}	8	A
ESD according to IEC61000-4-2 air discharge	V_{ESD}	± 30	kV
ESD according to IEC61000-4-2 contact discharge		± 30	
Operation temperature	T_{OP}	-40 to 85	$^{\circ}C$
Storage temperature	T_{STG}	-55 to 150	$^{\circ}C$
Lead temperature	T_L	260	$^{\circ}C$
Storage temperature	T_{STG}	-55~150	$^{\circ}C$

Electrical characteristics ($T_A=25^{\circ}C$, unless otherwise noted)



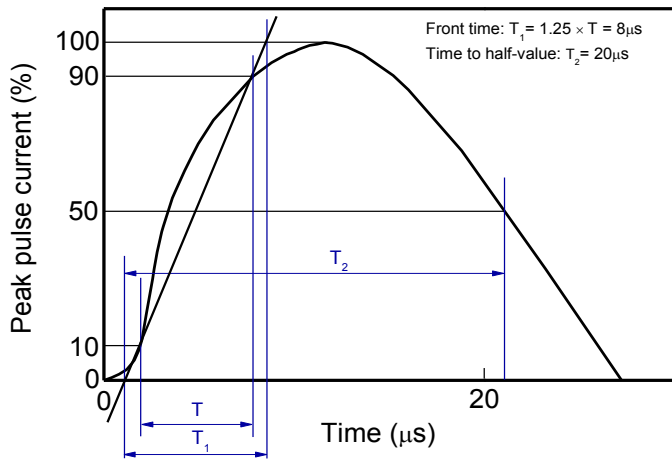
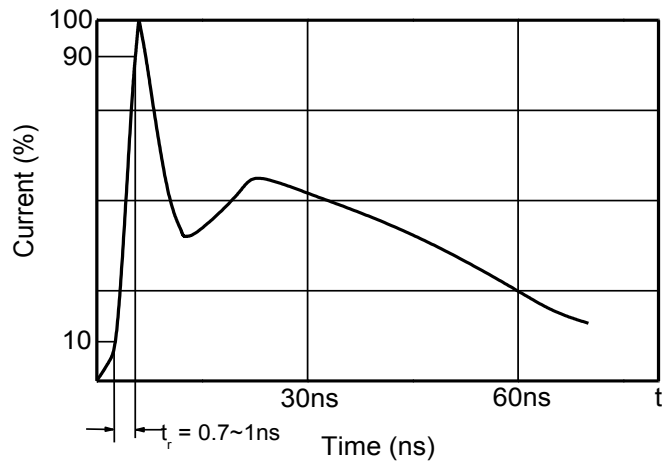
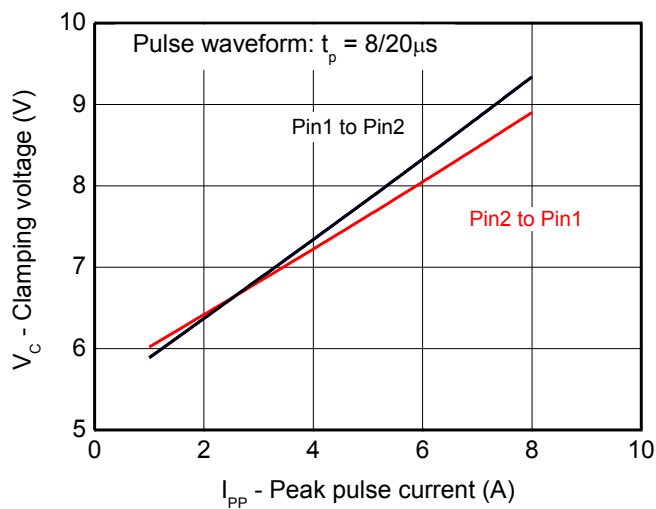
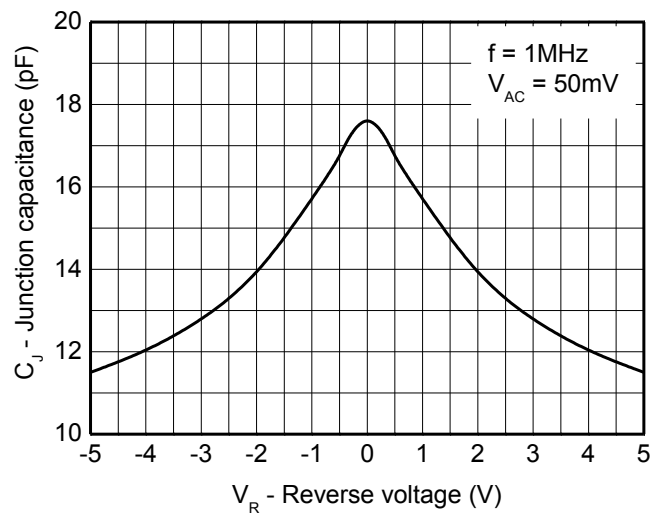
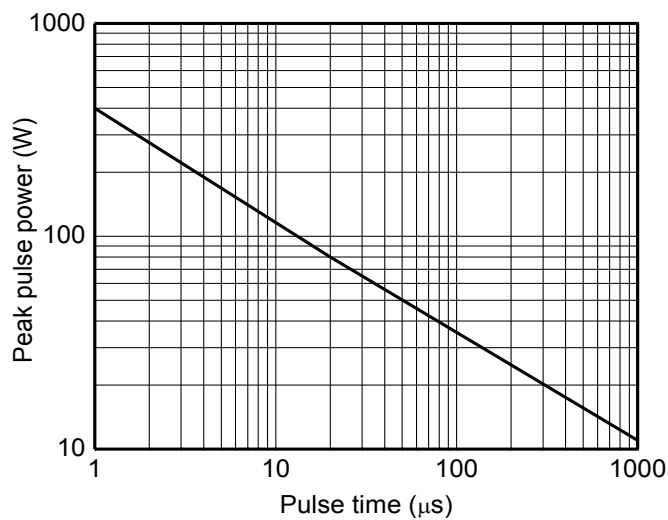
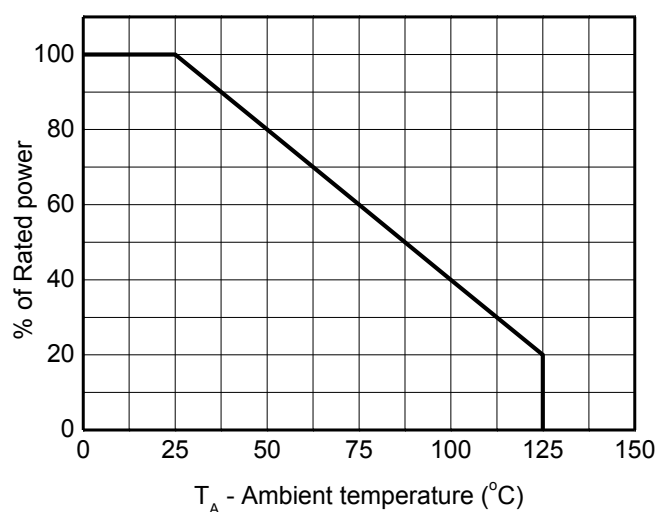
Definitions of electrical characteristics

Electrical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

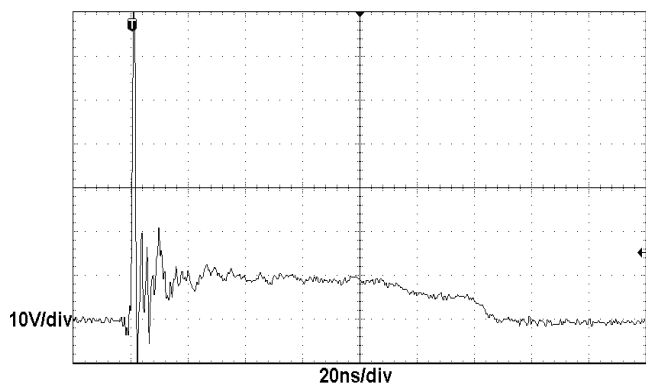
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Reverse stand-off voltage	V_{RWM}				± 5	V
Reverse leakage current	I_R	$V_{RWM} = 5\text{V}$		<1	100	nA
Reverse breakdown voltage	V_{BR}	$I_{BR} = 1\text{mA}$	5.1			V
Reverse holding voltage	V_{HOLD}	$I_{HOLD} = 50\text{mA}$	5.1			V
Clamping voltage ¹⁾	V_{CL}	$I_{PP} = 16\text{A}$, $t_p = 100\text{ns}$		9		V
Clamping voltage ²⁾	V_{CL}	$V_{ESD} = 8\text{kV}$		9		V
Clamping voltage ³⁾	V_{CL}	$I_{PP} = 1\text{A}$, $t_p = 8/20\mu\text{s}$			6.5	V
		$I_{PP} = 5\text{A}$, $t_p = 8/20\mu\text{s}$			8.5	V
		$I_{PP} = 8\text{A}$, $t_p = 8/20\mu\text{s}$			10	V
Dynamic resistance ¹⁾	R_{DYN}			0.20		Ω
Junction capacitance	C_J	$V_R = 0\text{V}$, $f = 1\text{MHz}$		17.5	22	pF
		$V_R = 5\text{V}$, $f = 1\text{MHz}$		11.5	16	pF

Notes:

- 1) TLP parameter: $Z_0 = 50\Omega$, $t_p = 100\text{ns}$, $t_r = 2\text{ns}$, averaging window from 60ns to 80ns. R_{DYN} is calculated from 4A to 16A.
- 2) Contact discharge mode, according to IEC61000-4-2.
- 3) Non-repetitive current pulse, according to IEC61000-4-5.

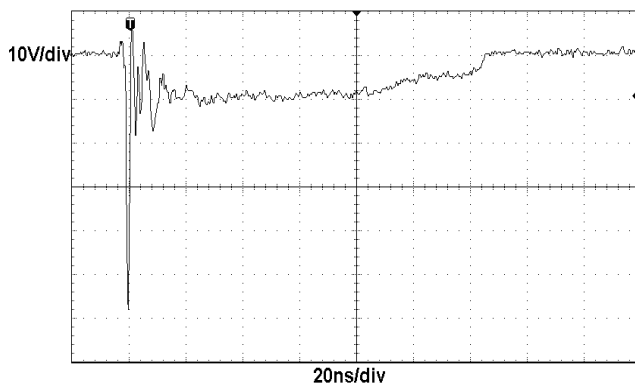
Typical characteristics ($T_A=25^\circ\text{C}$, unless otherwise noted)

8/20 μs waveform per IEC61000-4-5

Contact discharge current waveform per IEC61000-4-2

Clamping voltage vs. Peak pulse current

Capacitance vs. Reverse voltage

Non-repetitive peak pulse power vs. Pulse time

Power derating vs. Ambient temperature

Typical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)



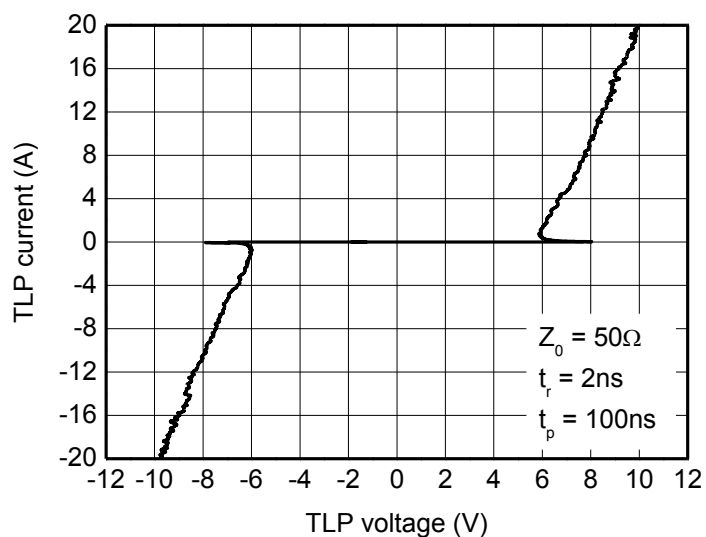
ESD clamping

(+8kV contact discharge per IEC61000-4-2)

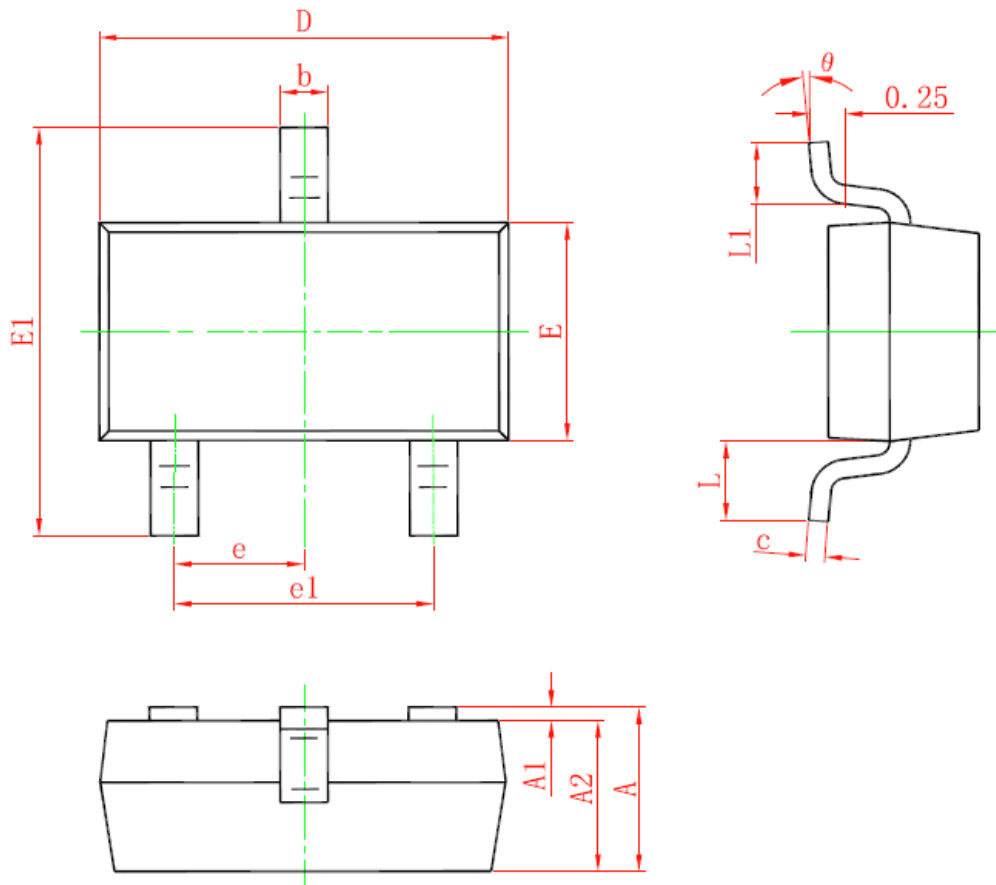


ESD clamping

(-8kV contact discharge per IEC61000-4-2)



TLP Measurement

Package outline dimensions
SOT-23


Symbol	Dimensions in millimeters		Dimensions in inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.550REF		0.022REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°